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EXERCISES.

104

A SPIRAL of Archimedes having its pole in the circumference of a given circle, passes through the centre and the point 120° of the circumference from the pole. Find its equation. [*O. Root, Jr.*]

105

IF the centre of the circumscribed circle of a triangle is on the circumference of the inscribed circle,

$$\cos \tfrac{1}{2}A \,.\, \cos^{\frac{1}{2}} A + \cos \tfrac{1}{2}B \,.\, \cos^{\frac{1}{2}} B + \cos \tfrac{1}{2}C \,.\, \cos^{\frac{1}{2}} C = 0.$$

If the same point is on the circumference of one of the escribed circles, a like relation holds. [*W. M. Thornton.*]

106

IF m be a positive integer,

$$\sin (m - 1)\varphi - x \sin m\varphi + x^m \sin \varphi$$

will contain

$$1 - 2x \cos.\varphi + x^2.$$

[*A. Hall.*]

107

GIVEN one vertex of a rectangle and the ratio of its sides, construct the rectangle so that the extremities of the diagonal opposite to the given vertex shall lie

1. On two given parallel straight lines,
2. On two given intersecting straight lines,
3. One on a given line and the other on a given circle,
4. On two given circles. [*R. D. Bohannan.*]

108

CONSTRUCT an equilateral triangle of given size inscribed in a given equilateral hyperbola. [*R. H. Graves.*]

109

EACH of four equal circles touches two of the others. Find the average area included between them. [*Artemas Martin.*]

SELECTED.

110

SOLVE the triangle ABC; given a, A and the product $\beta\gamma$ of the bisectrices drawn from B, C to CA, AB.